

though such activity was rightly made illegal by the Digital Millennium Copyright Act (DMCA). However, DRM does deter from piracy many users who, in the absence of DRM, would illegally copy the digital content.

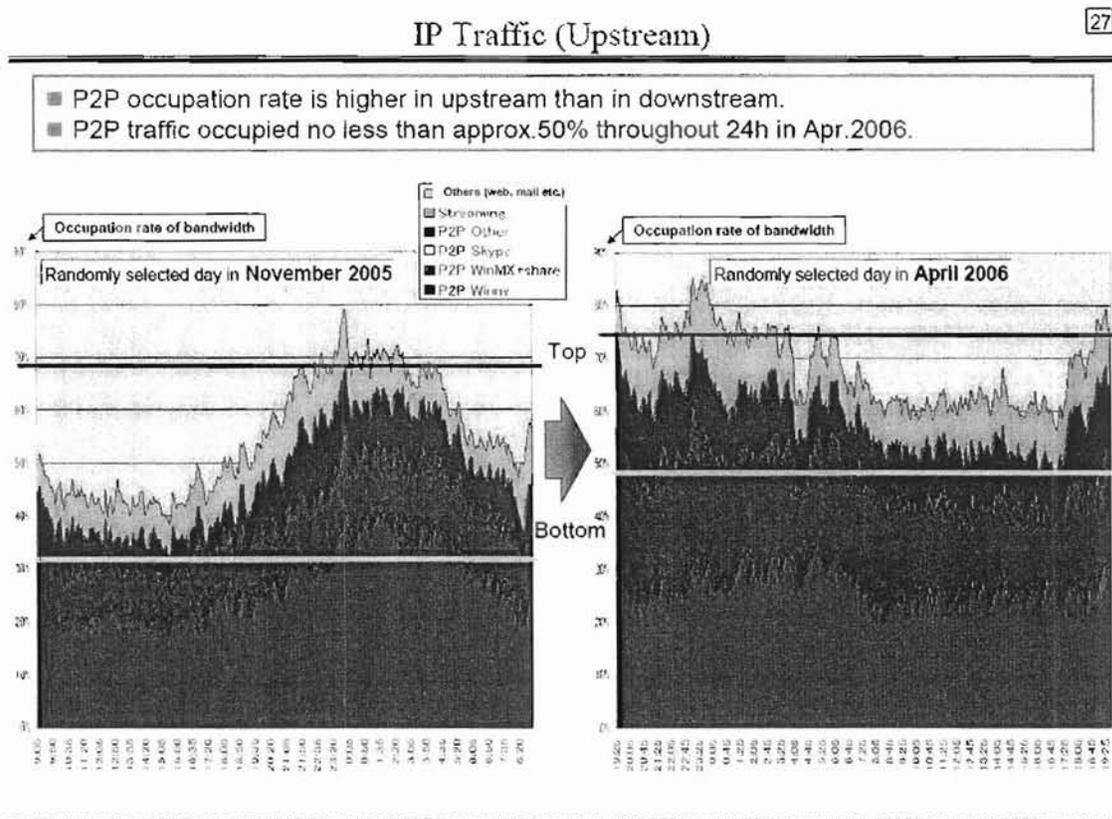
DRM also typically imposes additional requirements on the user that can, in some cases, reduce the value of the product. For example, DRM may require Internet access to connect to a licensing server, making use of certain software or media more difficult on an offline PC. DRM can also create interoperability challenges, especially for proprietary technology, as not all devices may support all DRM implementations. For example, an e-book downloaded from Amazon for the Kindle may not be compatible with a Sony e-Book reader. While initially most of the music sold online contained DRM, the trend within the music industry now seems to be towards DRM-free music, as Apple's iTunes store and Amazon, two of the largest online retailers, have moved away from selling music tracks with DRM. The trend with e-book retailers continues to be to imple-

ment DRM. DRM is also appearing in some computer hardware and consumer electronics. For example, as video cards have adopted digital outputs, many have implemented digital copy protection schemes to prevent unauthorized copying of high-definition digital video. Televisions in the future could also contain anti-piracy devices that would prohibit the playback of copyright-protected content.

#### NETWORK MANAGEMENT

Internet service providers (ISPs) around the world are replacing "all you can eat" unlimited service plans with volume-bounded service plans or usage-sensitive pricing plans. A recent OECD report found that as a result of growing use of high bandwidth applications, including P2P applications, "some operators responded by imposing limitations on the amount of bandwidth that users are allowed to transmit in a given month. These bit caps were typically found in island countries with limited international transmission capacity, but they have now appeared in other OECD countries as well. Currently there are offers with explicit bit caps in two-

Figure 2: Increase in Upload Traffic in Japan and the Role of P2P Traffic



thirds of OECD countries.<sup>24</sup> For example, a March 2007 survey found that almost 95 percent of broadband subscribers in New Zealand had plans with a data cap of 5 gigabytes or less.<sup>25</sup> In Japan, ISPs also place a monthly limit on uploads, which effectively throttles P2P use; this cap is in place despite the enormous capacity of last-mile networks in Japan, which can be as high as 1 gigabit per second.<sup>26</sup> The actions were taken by the ISPs because, as shown in the graphs, P2P traffic makes up a significant portion of Internet traffic.

These moves are an indirect reaction to digital piracy, because pirates constitute the largest group of Internet users engaged in uploading and downloading the largest amounts of content. For example, in Japan, the Ministry of Communications reports that over 50 percent of broadband traffic is from P2P file sharing, most of it illegal. And these high bandwidth-using pirates cost ISPs more to serve, thereby, in the absence of volume-based plans, leading to higher prices for all consumers. This is a particular problem for rural ISPs, because they pay more for Internet transit than their better-connected urban counterparts and frequently rely on wireless last-mile connectivity that is harder to accelerate than wireline systems. In addition to usage caps, some ISPs around the world, particularly cable systems that have more limited upload capacity, have adopted systems that lower the priority of packets flowing to and from their heaviest users during periods of high network load.

While network traffic management systems are more a reaction to the problems piracy cause to network performance than an effort at mitigation, their use has been criticized by proponents of open access to copyrighted material on grounds that they limit free expression. Public Knowledge's technical consultant Robb Topolski has described such systems as a form of "discrimination based on user-history [sic]" that should be forbidden under network neutrality laws.<sup>27</sup> But to the extent that such systems provide a better Internet experience for the majority of law-abiding customers, they are actually pro-consumer.<sup>28</sup>

Network management tools are also used by colleges and universities where unauthorized file sharing is common. Given that these P2P file sharing networks are used predominantly for the illegal exchange of copyrighted content and their use limits the amount

of bandwidth available for legitimate research and academic purposes, some university network operators have implemented network management schemes to block or degrade the use of certain P2P services. Many universities acted swiftly to implement bans on certain P2P file sharing applications in the early days of P2P file sharing networks. For example, in August 2000, 34 percent of U.S. universities banned their campus Internet users from using Napster.<sup>29</sup>

While network management is not a rights enforcement tool, it is a necessary part of a comprehensive mitigation strategy against harms caused to the Internet ecosystem by piracy. The Internet is a shared resource system by design, and those who attempt to consume more than a fair share of resources without paying an additional price to cover these extra costs make it less responsive to others, whether they are engaging in piracy or not. Internet regulators must remain mindful of the impact that piracy has on legitimate network users and should not limit or ban reasonable network management practices that enforce fair sharing of network resources.<sup>30</sup>

#### P2P NETWORK POLLUTION

Because a great deal of piracy begins with users uploading torrent files to indexer sites like The Pirate Bay and Mininova, rights enforcement efforts sometimes take the form of polluting these sites with bad copies of content files. The process begins with a rights holder uploading a torrent file to the indexer site and seeding one or more computers with fake copies of an apparently pirated movie or television program. HBO employed such tactics to limit the piracy of its popular series *Rome* by running systems on P2P networks that advertise that they have a portion of the pirated file but sending the wrong data to downloaders. Although P2P file sharing clients can detect and recover from this tactic, it can significantly slow down the download process.<sup>31</sup> A similar strategy was used by the music industry to frustrate users who attempted to download unauthorized copyrighted music files from P2P networks like Kazaa. The recording industry flooded the P2P networks with files that appeared to be high-quality recordings, but instead only contained a brief clip of the music followed by static. Techniques such as this are used to make illegal file sharing more difficult than legally acquiring the content but have generally been ineffective at significantly scaling back digital piracy.

Such strategies are often quite effective if pursued diligently enough, because piracy between parties who are not known to each other depends largely on trust, but indexer pollution has the effect of moving would-be pirates to private indexers with administrative staff who monitor torrent files for quality. Gaining access to a private indexer typically requires an invitation, and for that reason private indexers have smaller numbers of users, but such sites are much harder to invade and pollute than public indexers.

#### CONTENT IDENTIFICATION

Content identification systems recognize copyrighted content so that copyright owners can take steps to reduce digital piracy. Using these systems, copyrighted content can be detected by automated means if others try to share it on file sharing networks or websites. The technology can be deployed at various locations, including on peer computers, file-sharing networks, servers of user-generated content websites, consumer electronics, and at the ISP level as data passes through networks into and out of network endpoints. Various technologies can be used to identify content including digital watermarks, fingerprints, and metadata.

- **Watermarking** systems embed identifiable data in audio and video content that are invisible and inaudible to humans but easily recognized by content recognition systems. Unique watermarks are embedded in theatrical releases of movies in such a way that if someone records the movie with a camcorder and then distributes the video, the studio can still recognize the watermark and identify the source of the recording. Watermarks are also used, in conjunction with DRM, on optical media such as DVDs and Blu-ray discs to prevent and detect unauthorized copying.<sup>32</sup> Watermarks can be difficult to remove—even when the content is purposely altered—and are therefore an important step in limiting the unauthorized distribution of licensed material.
- **Fingerprinting** is a means of extracting easily-recognized features from audio and video content that are not deliberately placed in the content but are nonetheless essential. For example, fingerprint detection systems may look for a given musical melody or voice clip in a song or soundtrack of a movie and match it to a melody in a music database, in much the same way that music discovery systems, such as

the mobile phone application Shazam, operate. Similar fingerprinting technologies are also used for video. Using fingerprints, content owners can easily determine if their content has been uploaded to a website like YouTube, for example, which enables the website to reject the upload and prevent others from viewing or downloading it. Digital fingerprints can be highly accurate and difficult to defeat, and they have been implemented in various well-known content identification systems such as Audible Magic and Vobile.

- **Metadata** systems look for the content identifiers used by piracy-enabling P2P applications, such as BitTorrent, for database matches with known unlawful content. When content is made available through piracy indexes such as the Pirate Bay or Mininova, an identifier called a hash tag is calculated based on the entire contents of a file, which enables the file to be uploaded and downloaded without ambiguity. A given piece of content may be made available for piracy in a number of formats, and each unique format will generate a new hash tag, so keeping the database of unlawful hash tags up to date can be challenging. Hash tags can also be obscured by encryption, but rights holders have found back doors into piracy encryption systems that allow them to decrypt and inspect unlawful content.<sup>33</sup>

Each of these systems employs a database, a feature-extraction system, and a pattern-matching engine that together are similar to the systems that are commonly used to block spam and protect personal computers from viruses and other forms of malware. As with these protection systems with which most people are familiar, content recognition systems are not perfect. Some may miss certain unlawful transactions and may falsely identify others, but on balance they are useful tools that can decrease the incidence of piracy wherever they are employed. Moreover, some tools today are highly accurate and through innovation the technology can, and likely will, improve even more.

#### BLOCKING INTERNET USERS FROM WEBSITES THAT INDEX OR TRACK PIRATED CONTENT

Critics of piracy mitigation have focused most of their attention on the supposed drawbacks of filtering, and have tended to ignore alternate approaches that are either supplemental or independent to filtering. One

## BOX 1: THE DEBATE OVER CONTENT IDENTIFICATION TECHNOLOGIES

Currently an important debate exists about the use deep packet inspection (DPI)-based filtering systems by Internet service providers (ISPs) and the relative merits and demerits of such systems. The recent paper by the advocacy group Public Knowledge, "Forcing the Net Through a Sieve," represents one side of the DPI debate.<sup>34</sup> While DPI opponents like to rely on emotional terms such as "technological arms races" and "false positives" and to make various assumptions about system performance effects, in fact piracy mitigation with DPI deals with a set of issues virtually identical to the largely non-controversial question of virus detection and mitigation.

Like DPI vendors, anti-virus manufacturers are engaged in a technological arms race with virus creators, who rely on highly advanced, open-source production systems to evolve better viruses in order to escape detection and removal.<sup>35</sup> No one seriously argues that personal computer users should stop using anti-virus software because of the challenges to keeping virus signatures and detection algorithms up to date. Rather, users are advised to rely on multiple systems of detection and removal in light of the deficiencies of each such system. Similarly, no credible source advises users not to employ anti-virus software because the dangers of having their computers hijacked by a botnet are so low. Those who suffer most from botnets are the targets of botnet abuse such as distributed denial of service attacks, and not those whose computers are hijacked. A concern for the overall health of the Internet ecosystem argues for aggressive tracking and removal of such threats.

However, advocates who argue the shortcomings of DPI-based content recognition systems tend to overstate their current shortcomings and underestimate their potential benefits.<sup>36</sup> The Public Knowledge report builds a content recognition strawman that claims that content recognition will reduce Internet performance, violate well-established principles of personal privacy and free speech, violate the Internet architecture, and raise the price of Internet access, all the while failing to protect rights holder interests in any significant way. Public Knowledge summarizes the harms as follows:<sup>37</sup>

1. **"Copyright filters are both underinclusive and overinclusive. A copyright filter will fail to identify all unlawful or unwanted content while harming lawful uses of content."**

Even to the extent that this criticism is correct, it is ultimately irrelevant. There are no completely perfect systems, applications, or protocols on the Internet or in any other aspect of modern life; we do not evaluate technical systems by comparing them to abstract ideals of perfection, but by balancing the utility they provide against the harm and inconvenience they entail. Given that the harm to American society from digital piracy is large and growing, the utility of copyright filters is not insignificant. Content recognition systems are no less perfect than personal anti-virus tools and much more precise than spam detection technology, so they are highly useful for the purpose for which they were designed. The imperfect nature of such systems simply argues for their oversight by responsible people and mechanisms. It is certainly true that a poorly-designed piracy detection system may incorrectly flag some lawful transactions; it is imperative that such systems are not allowed to disrupt such transactions or take punitive actions against suspected pirates without proper human oversight. Piracy is fundamentally a social problem more than a technical one, hence it is inappropriate to apply purely technical controls to it.

That being said, some technical systems have been shown to be highly accurate, such as the digital fingerprinting systems that prevent YouTube and similar services that host user-generated content from hosting copyrighted material. For such systems to be effective, however, the content hosting service has to agree to implement necessary procedures to check that uploaded content does not match materials in a database of copyrighted content, and also remove pirated content. Copyright owners must also supply each of these sites with copies of the fingerprints or watermarks used to identify their content.

2. **"Copyright filter processing will add latency. Copyright filters will slow ISP networks, discouraging use, innovation and investment and harming users, businesses and technology policy initiatives."**

This criticism is simply unfounded in technical fact. As packets pass through a network, they are examined and forwarded multiple times by Internet routers and switches. Internet routing is a pattern-matching activity that extracts a destination network address and matches it to an interface by consulting a large table of network address and interface associations. The technology that performs routing typically runs at close to "wire speed," the rate at which a packet would transit the router if the destination interface were known in advance. Some content recognition systems use parallel processing to perform additional pattern-matching activities (beyond the destination network address) at the same time that basic routing functions are performed and do not add delay. Other, less expensive systems send a copy of each packet to be examined to an out-of-band system that performs analysis in its own time. Since these systems are not in the forwarding path of network traffic, they also do not add delay.

The purpose of content recognition systems is to reduce the total amount of unlawful transactions as a whole, not to prevent the forwarding of specific unlawful packets. As this is the goal, it is simply necessary for the rights holder or network operator to identify the persons who engage in such transactions, not to recognize and suppress each and every pirated packet. If disrupting the transaction is the goal, it can certainly be accomplished by systems that require a few minutes of passive examination to recognize that a particular in-progress stream contains unlawful content, for example. This passive monitoring time does not affect the timeliness of the overall transfer; it is simply reaction time on the part of the monitor. In particular, the widely used Audible Magic system that matches digital fingerprints is an out-of-band system that has no impact on network performance at all.

3. **"The implementation of copyright filters will result in a technological arms race. Users will act to circumvent the filters and the architects of the filters will find themselves caught in a costly, unwinnable arms race."**

This criticism is extremely weak. Any use of technology in the interest of law enforcement faces attempts by law-breakers to circumvent the system: bank robbers wear masks and burglars litter crime scenes with other people's cigarette butts, yet we still track them down and prosecute them. Each technology that employs pattern recognition must be periodically updated to keep up with the state of the art in criminality, and the costs of doing so probably decline with time and experience. Anti-virus systems in particular need to be updated on a regular basis to remain effective, yet they're widely used, and the overall rate of change in piracy-enabling systems is much slower than it is for viruses. Moreover, if there is any blame here it is on the side of "users" (i.e., pirates) who seek out and use better technology in order to engage in piracy. Simply saying that because pirates will continue to use better technology that content holders and ISPs should give up is to declare piracy a socially acceptable practice.

4. **"Copyright filters do not make economic sense. The monetary costs associated with copyright filtering far outweigh any perceived benefits."**

Unfortunately Public Knowledge did not offer data to support this claim in even the most rudimentary fashion. The cost of content recognition can be high or low according to the particular implementation strategy for the system. The ultimate goal of such systems is simply a meaningful reduction in lost sales of licensed material and to capture new sales, and this can be accomplished by a system of spot checks in random locations sufficient to communicate to would-be pirates the possibility of detection. Changing behavior in a positive direction is the goal of criminal justice; perfecting humanity is not. This point simply argues for experimentation to determine the actual cost of content recognition. If these systems are in fact uneconomical (i.e., the cost is significantly more than the benefits of reduced piracy), this fact will come to light and the experiment will be halted until such time as the economics change.

5. **"Copyright filters will discourage investment in the Internet economy. Copyright filters will disrupt the Internet ecosystem, severely undermining our most promising engine for economic growth."**

This claim seems to assume that piracy is the bedrock of the Internet economy, an assertion not backed up by any evidence. There are many ways to use the Internet that do not infringe on content licenses, such as interpersonal communication, shopping, social networking, education, and legal downloading of content. As these uses are so valuable they will continue to grow regardless of the steps taken to limit unlawful behavior. Moreover, limiting anti-piracy technologies will certainly limit innovation in this part of the Internet economy. This type of innovation is not only useful for developing better anti-piracy tools, but the same technology can be applied to develop new features and services for consumers. And to the extent that these and related technologies (e.g., filters to identify spam or malware) improve, the overall Internet innovation ecosystem will benefit since the Internet will be more trustworthy and secure.

6. **"Copyright filters will harm free speech. Due to technological limitations, copyright filters will harm lawful, protected forms of speech such as parody and satire."**

License enforcement systems currently in use or in development target entire downloads of movies, television programs, and music on a repeated basis by major infringers. The gulf between this kind of behavior and the minor instances of confusion with protected activities is so large as to strain credulity. Free speech rights do not imply the right to make unlawful copies of other people's copyrighted works, regardless of the final purpose. Creators who wish to make parodies of copyrighted works should be willing to come by the original copies of the works they parody legally. Moreover, proper oversight can ensure that

protected forms of speech which use a portion of copyrighted material within the bounds of the law are recognized as such by content identification systems.

7. **“Copyright filters could undermine the safe harbor provisions that shield ISPs from liability. Under the Digital Millennium Copyright Act (DMCA), ISPs are shielded from liability for their users’ actions. Copyright filters could undermine these safe harbors, which have allowed the Internet to become the most important communications medium of the modern era.”**

There are provisions in Title II of the DMCA (pertaining to safe harbors) that “preserves strong incentives for service providers and copyright owners to cooperate to detect and deal with copyright infringements that take place in the digital networked environment.”<sup>38</sup> Likewise, the legislation was drafted in a way to not “discourage the service provider from monitoring its service for infringing material. Courts should not conclude that the service provider loses eligibility for limitations on liability under section 512 solely because it engaged in a monitoring program.”<sup>39</sup> Moreover, even if these DMCA provisions do not provide strong enough protections, which appears to not be the case, the law could be changed. In a regime in which ISPs are specifically directed to cooperate with content producers to limit piracy, the notions of safe harbors and limited liability would obviously need to be contingent on anti-piracy cooperation. In fact, it is unlikely that ISPs will in fact be willing to go forward with large-scale experiments in digital piracy reduction without some form of legal protection.

8. **“Copyright filtering could violate the Electronic Communications and Privacy Act (ECPA). Copyright filtering could constitute unlawful interception under ECPA.”**

ISP-level filtering of copyright content may or may not constitute a violation of ECPA. For example, ISPs may adjust their terms of use to gain consent from their customers to allow this activity or give users a higher bit cap if they permit ISP-level content filtering. If, however, a court decision or industry consensus emerges that states ECPA does prevent ISPs from implementing filtering technology, then the law should be changed. Currently Reps. Rick Boucher (D-VA), Bobby Rush (D-IL) and Cliff Stearns (R-FI) have stated their intent to introduce legislation in 2010 that may clarify and define the boundaries of personal privacy and delineate permitted practices relative to Internet Protocol payload examination.

Other opponents of ISP-level filtering may use the argument that such technology violates their personal privacy. However, Internet packets are examined by automated systems as a matter of course on the Internet today and always will be; the nature of Internet routing requires examination in order for packets to be delivered. Privacy only becomes an issue when packets are retained, analyzed, shared, or viewed by an individual. As long as these activities are performed in a responsible way in accordance with legal guidelines, there is no particular basis for worry. For example, the email service Gmail depends on the exact examination of highly personal communication in order to serve up targeted ads, but only a computer examines the packets and the email data are not shared or read by humans.<sup>40</sup>

As a general matter, Public Knowledge and most other advocates who oppose efforts to limit digital piracy express the fear that anti-piracy measures violate the Internet architecture, which in their minds mandates a particular form of service from the infrastructure. As Public Knowledge wrote in its recent report opposing efforts to limit digital piracy, “The Internet was designed to be an open system from end-to-end, which is to say, a system that moves content between hosts and clients as quickly as possible on a first-come, first-served basis—regardless of the nature of that content.”<sup>41</sup>

On the face of it, such a statement is overly simplistic at best. The Internet was not designed to be an open system that moved viruses and other malware as quickly as possible. This kind of all-or-nothing view of the Internet fails to understand what the Internet is. As ITIF demonstrated in a report, “Designed for Change,” on Internet architecture, the actual nature of the Internet is and always has been quite different.<sup>42</sup> The Internet was designed to serve as a testbed for experimentation in network applications, protocols, and services, not to serve as a monument to network technology as it may have existed at any particular moment in time. If it has a central principle, then it is one of constant change. As problems emerge in the use and management of the Internet, engineers devise solutions. With the advent of high-speed broadband access, piracy has become a problem that demands a solution. As with myriad other problems, it will be resolved by technical and behavioral systems in a manner perfectly consistent with the Internet’s actual and legitimate heritage.

alternate approach focuses on the websites and technologies that exist for the sole, primary, or significant purpose of enabling digital piracy. Enabling digital piracy is a profitable business, and there can be little doubt that profiting from unlawful activity is indefensible. There is also little difficulty in recognizing such sites, as they often fail to respond to legitimate takedown notices, or fail to do so in a timely manner, and prominently display indexes of unlawful content.

One such site is The Pirate Bay, which a Swedish court recently found to have engaged in unlawful conduct. In a statement, the court said, "The court has found that by using Pirate Bay's services there has been file-sharing of music, films and computer games to the extent the prosecutor has stated in his case. This file-sharing constitutes an unlawful transfer to the public of copyrighted performances."<sup>43</sup> The four founders of The Pirate Bay were sentenced to a year in prison and ordered to pay fines of \$3,620,000. Pending appeal, the web site is still operational, although it has stopped operating a BitTorrent tracker in favor of an alternate form of content discovery known as Distributed Hash Tables (DHT) that is more difficult to block. As explained by The Pirate Bay, "The development of DHT has reached a stage where a tracker is no longer needed to use a torrent. DHT...is highly effective in finding peers without the need for a centralized service."<sup>44</sup> The Pirate Bay apparently hopes to escape future liability by discontinuing its "tracker" service. While The Pirate Bay is not directly involved in transferring packets between unlawful file sharers, it provides the vital role connecting digital pirates to each other, acting as a procurer of piracy services.

Even before the Swedish court rendered its verdict, there was no doubt that The Pirate Bay existed for unlawful purposes. Not only does the site offer detailed, hand-created indexes of unlawfully copied TV shows (<http://thepiratebay.org/tv>) and music (<http://thepiratebay.org/music>), it also provides access to unlawful versions of software, books, and games. The site is supported by the sale of advertising.

It should come as no surprise that the site has been ordered off the Internet by the court. What is surprising is that Internet service providers have not acted to block websites such as this that clearly facilitate the exchange of illegal content when it would be quite simple as a technical matter to block them. Blocking these

websites could be achieved by blocking DNS queries or connections to IP addresses hosting these piracy websites. For example, an ISP could blackhole DNS queries to the domain names, such as [thepiratebay.org](http://thepiratebay.org), or redirect them to the Justice Department.<sup>45</sup> While The Pirate Bay may respond by changing its domain name, blackhole lists can generally be updated as easily as new domains can be registered. But absent federal government mandates to block sites like The Pirate Bay, it may not be in the interest of any individual ISP to block these sites since doing so would reduce its attractiveness to customers who want to engage in digital piracy. An ISP could also block the IP addresses used to host such websites. In both of these approaches, the government or some other well-recognized and responsible party may need to be responsible for publishing a real-time list of domain names or IP addresses to block.

While blocking is one possible solution, that technology can obviously be used for both good and bad purposes. Several countries, some of which have anti-democratic aims—such as China, Cuba, Iran and North Korea—have blocked access to certain websites with varying degrees of success. However, as is the case with all technologies, blocking technologies can be used for pro-democratic, pro-consumer purposes. In the United Kingdom, as many as 80 percent of ISPs use the blacklist published by the Internet Watch Foundation, a non-profit organization that maintains a list of offensive websites.<sup>46</sup> According to its mission statement, the Internet Watch Foundation works to minimize the amount of "child sexual abuse content hosted anywhere in the world and criminally obscene and incitement to racial hatred content hosted in the UK."<sup>47</sup> These systems are not perfect, of course, and there have been isolated incidents in which they've filtered legitimate content. This is why such systems need to provide a means of correcting classification errors. Australia's Communications Minister Stephen Conroy has also put forward the idea of implementing a national level filtering plan for website content, including filtering child pornography, gambling websites and other content that "offend against the standards of morality."<sup>48</sup> In February of 2009, the plans appeared to be derailed when it did not seem the government would have the votes to pass the required legislation. If a country chooses to implement this type of solution, it should be careful to craft policies that ensure that the technology is not abused to limit legitimate free speech and openness, and that mistakes can be remedied. For

example, any publisher of a blacklist of unlawful file sharing sites to which ISPs would be required to block access should be required to provide a credible and responsive means for wrongly identified services to protest and be removed from the list and for correctly identified services to be unblocked after removing the offending content. Real-time blacklists have proved useful for combating spam and distributed denial of service attacks, hence it is reasonable to apply them to piracy as well, with suitable controls. There is nothing inherent about the Internet, nor should there be, that precludes the limitation of some kinds of content on it. Just as in society as a whole, there are limitations in all societies on some kinds of content and behavior.

#### BLOCKING INTERNET USERS FROM WEBSITES THAT OFFER PIRATED CONTENT

In addition to P2P networks, a large amount of pirated digital content is available on websites for either direct download or streaming. Just as with legitimate websites, these sites generally come in two formats, an ad-supported model and a paid content model.

Currently, Internet users can easily go online and, with just a few clicks, find full-length Hollywood movies to watch for free. Websites like Movie2k.com ([www.movie2k.com](http://www.movie2k.com)) and Watch Movies ([www.watch-movies-online.tv](http://www.watch-movies-online.tv)) provide indexes of movies and television video programming available to watching instantly for free online. These websites link to streaming sites such as Movshare ([www.movshare.net](http://www.movshare.net)), Stream2k ([www.stream2k.com](http://www.stream2k.com)), MegaVideo ([www.megavideo.com](http://www.megavideo.com)), Divxstage ([www.divxstage.net](http://www.divxstage.net)), and Novamov ([www.novamov.com](http://www.novamov.com)) that allow users to upload and share movie-length videos at no cost to the user. Live programming is also recorded and distributed online through websites like Livestream.com and Justin.tv. This form of piracy is used to pirate live sports events, such as NBA, NFL and MLB games, to Internet users, including international users who cannot otherwise gain access to the programming. This form of piracy is particularly strong in China where millions of users watch pirated U.S. sports programming online.<sup>49</sup> One reason that pirates are using websites to distribute copyrighted content is that bandwidth and storage

Figure 3: LegalSounds.com Music Service

are relatively cheap and these costs can be supported by advertising.<sup>50</sup> These ad-supported websites offer copyrighted content online at no cost to the user and profit by selling advertising for content that they have pirated.

Other websites sell pirated content online while often masquerading as legitimate businesses. These piracy sites often have the look and feel of legitimate online stores such as iTunes or Amazon.com. One such site is the Russian website LegalSounds.com, which poses as a music store and charges membership fees. A hapless consumer wishing to obtain digital music lawfully could easily be confused by the LegalSounds.com website, which includes a “legal-sounding” terms of service agreement and the trappings of a legitimate service. When a site is named “LegalSounds.com” and says prominently on its home page “download music that is free, legal,” it is not surprising that many law-abiding

consumers would believe that they are not breaking the law. One might reasonably conclude that the content offered is legitimate and enroll in the service. The same is true for the Russian site ZML.com that hosts movies for download.

Existing laws against fraud and false advertising apply to such sites, but the Internet enables them to spring into existence, change identities, and move about much faster than the legal system can keep up with them. Moreover, many of these sites are in nations where the service is legal or where the national government turns a blind eye to enforcement. Once again a simple blocking solution at the ISP level may be the most effective means of preventing Internet users from using these websites to engage in digital piracy domestically. Such a system could divide the burden of initial enforcement between rights holders and ISPs and could be overseen by the Federal Trade Commission. Real-time mecha-

Figure 4: ZML.com: A Russian Movie Piracy Site

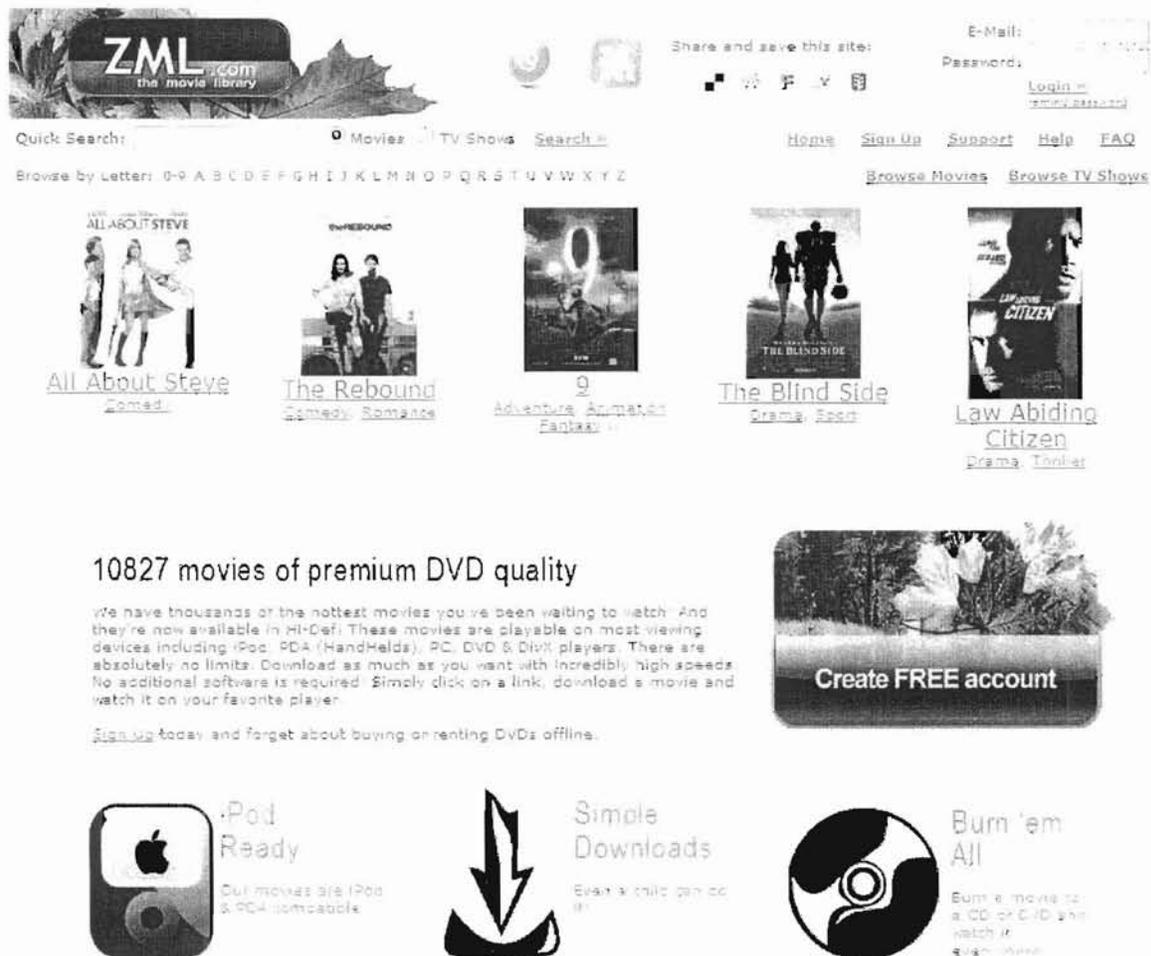


Figure 5: Search Engine Results Delivering Piracy Sites

The screenshot shows a Google search for "Star Wars". The search bar contains "Star Wars" and a "Search" button. Below the search bar are links for "Torrent Search" and "Web Search". The results are categorized under "Ads by Google".

**Ads by Google**

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- Star Wars**  
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Star Wars Comics - Comprehensive. Type: Other > Comics: Files: 719 .... does this include all the comics out there of star wars? ...  
theiratebay.org/torrent/3906110:Star\_Wars\_Comics\_-\_Comprehensive

nisms such as this are necessary to deal with real-time Internet offenses and are entirely appropriate, provided that falsely identified parties have equal real-time recourse to prevent abuse.

#### BLOCKING INTERNET USERS FROM SEARCH ENGINE SERVICES PROVIDING ACCESS TO PIRACY WEBSITES

Another enforcement measure that does not depend on filtering is blocking access to piracy services by Internet search services such as Google. There is no compelling reason why these services should provide easy access to unlawful content, as Google does with its ability to search for BitTorrent files. Google offers the ability to create a custom search for torrent files which indexes piracy sites. As shown in Figure 5, a search for Star Wars returns the instances of unlawful content.

The first hit points to a collection of all six Star Wars DVDs on Mininova, a site similar in nature and purpose to the Pirate Bay.

There is no reason in principle that search engines should be immune from responsibility for the action of selling advertising for indexing piracy sites. If these services know enough about the searches they perform and the sites they index to match ads with searches, they surely should know enough to block unlawful sites from their search results. (In fact, earlier this year The Pirate Bay was “accidentally” removed from Google’s search results, but Google manually reinstated the website.<sup>31</sup>) All it takes for search engines to stop the practice of facilitating piracy is a commitment to not support websites that engage in unlawful acts. A search engine that

can place appropriate ads on a page showing pirated content can suppress the content as well. However, for such sites to do this, they need to know that they will not be attacked by government or by those opposed to serious efforts to fight digital piracy.

#### **BLOCKING FUNDING FOR WEBSITES AND ORGANIZATIONS THAT SUPPORT PIRACY**

Websites and organizations that facilitate piracy require funding to stay in business. As described earlier, these websites often get funding through online advertising or through direct sales of pirated content. One way to reduce piracy is to block these sources of funding so as to make piracy unprofitable or less profitable.

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*Responsible companies should not advertise on websites that facilitate piracy and responsible ad networks should not buy placement on these websites.*

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Many websites that facilitate piracy fund their efforts through online advertising. For example, the website isoHunt promotes its website to potential advertisers as follows: “[Our website] attracts more than 16 million unique visitors every month. Do you sell products that you think will attract early adopters? MP3 players, computer / console hardware, or gadgets of all sorts? Advertise with us!”<sup>52</sup> Online advertisers include major brands that advertise either directly on these websites or indirectly through advertising networks that do not choose to distinguish between websites that facilitate piracy and those that do not. For example, a recent review of the advertisers on the websites The Pirate Bay and isoHunt found brands such as Amazon.com, Blockbuster, British Airways, and Sprint, and these websites have previously included advertisements from companies such as Walmart.<sup>53</sup> Responsible companies should not advertise on websites that facilitate piracy and responsible ad networks should not buy placement on these websites.

Banks should also restrict customers from using their credit and debit cards to make payments to the websites that sell pirated content. Similar restrictions have already been put in place by banks and credit card issuers to limit payments and credits for online gambling with some success.<sup>54</sup> This type of effort was used briefly to limit piracy when the recording industry requested that

Visa and MasterCard block credit card payments to the Russian website allofmp3.com that was selling unauthorized copies of digital music. Unfortunately, after the operators of allofmp3.com sued to reverse this action, a Russian court ruled in favor of the website owners and stated that credit card companies could only break their contracts when their customer was found guilty of a crime.<sup>55</sup>

#### **Enforcing Legal Rights of Content Owners**

Content producers have also used legal means to protect their interests, including pursuing criminal and civil penalties against organizations and individuals engaged in or enabling copyright infringement.

#### **LAWSUITS AGAINST ORGANIZATIONS FACILITATING DIGITAL PIRACY**

Content producers have used legal means to shut down organizations that facilitate illegal file sharing. Major file sharing enterprises, such as Napster and Grokster, have been rightly shut down by court order following lawsuits by industry groups such as the Recording Industry Association of America (RIAA) and the Motion Picture Association of America (MPAA).<sup>56</sup> While the U.S. Department of Justice filed motions in support of the industry in these efforts, it took relatively little action to prosecute the individuals or organizations engaging in this activity.

Initially, the makers of file sharing software and operators of file sharing networks used two main arguments in defending the legality of their operations: one, that they did not make copies of copyrighted content and thus were not infringing on copyrights; and two, that their activity was protected under the ruling in the Betamax case that protected technology makers from being liable for misuse by users. Specifically, in the case *Sony Corp. of America v. Universal City Studios, Inc.*, the majority opinion wrote that “the sale of copying equipment, like the sale of other articles of commerce, does not constitute contributory infringement if the product is widely used for legitimate, unobjectionable purposes. Indeed, it need merely be capable of substantial non-infringing uses.”<sup>57</sup>

Many of these arguments came out in *Metro-Goldwyn-Mayer Studios, Inc. v. Grokster Ltd.*, in which the file-sharing service Grokster was sued by content producers for distributing P2P file sharing software. The

record companies and movie studios showed that not only did the Grokster file sharing service enable the exchange of any electronic file, including copyrighted files, but that Grokster specifically encouraged this type of use and profited from it. In a unanimous decision, the U.S. Supreme Court ruled against Grokster, stating, "We hold that one who distributes a device with the object of promoting its use to infringe copyright, as shown by clear expression or other affirmative steps taken to foster infringement, is liable for the resulting acts of infringement by third parties."<sup>58</sup> This case made clear that the owners of applications or services designed to enable file sharing of copyrighted content could be held liable for infringement by third-parties. Moreover, this case was part of a series of court rulings around the world in countries such as Australia, South Korea, and Taiwan, that found certain P2P file sharing networks liable for copyright infringement.<sup>59</sup>

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*Metro-Goldwyn-Mayer Studios, Inc. v. Grokster Ltd. made clear that the owners of applications or services designed to enable file sharing of copyrighted content could be held liable for infringement by third-parties.*

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In response to legal pressure in certain countries, organizations that facilitate unauthorized online file sharing, such as The Pirate Bay, have located themselves in countries where weaker laws protect them from criminal and civil lawsuits for copyright infringements. For example, The Pirate Bay operated for many years in Sweden before authorities began criminal prosecution of the individuals involved in the website's operations, leading the head of the MPAA to brand Sweden "an international piracy haven."<sup>60</sup> Digital piracy, both online and for physical media, is especially high in countries like China and Russia which generally have less protection for intellectual property. For these nations, piracy is a way to get content from developed nations without paying (and to enable those hosting pirate sites to make money), thereby increasing the trade surplus they enjoy with many nations. Agreements between countries are necessary to coordinate effective responses to digital piracy. International treaties and trade agreements such as the World Intellectual Property Organization (WIPO) Copyright Treaty and the Anti-Counterfeiting Trade Agreement can help facilitate enforcement of intellectual property rights worldwide.

#### LAWSUITS AGAINST INTERNET USERS ENGAGING IN DIGITAL PIRACY

In addition to pursuing legal action against businesses supporting copyright infringement, organizations such as RIAA and MPAA have filed numerous lawsuits against Internet users suspected of distributing copyrighted content without authorization. While RIAA has been much more prolific in filing lawsuits against thousands of Internet users suspected of copyright violations, MPAA has filed hundred of lawsuits as well.<sup>61</sup>

These lawsuits target individuals based on the IP address of suspected file sharers and typically result in out-of-court settlements. The motivation behind these lawsuits is to stop some of the most egregious examples of file sharing (e.g., users that upload large numbers of unauthorized files) and to increase the risk associated with unauthorized file sharing. However, pursuing lawsuits against individuals is an expensive process and does not scale well to the millions of users on the Internet who choose to download copyrighted content.

In combination with the lawsuits by content creators, these industries have also established amnesty programs to provide a means for users who download copyrighted content to avoid expensive lawsuits. RIAA created the Clean Slate program in 2003 that promised not to prosecute individuals who deleted and destroyed all unauthorized content that they had downloaded and promised not to infringe on copyrights in the future. More recently, Nexicon, Inc., a company that develops content identification tools and works on behalf of copyright owners, launched GetAmnesty.com. If Nexicon identifies the IP addresses of an Internet user suspected of downloading or sharing a copyrighted file, Nexicon will contact the user and provide a list of the files it believes were illegally downloaded. The user then has the option of paying for the copyrighted content on the GetAmnesty.com website and in return the rights' holders who contract with Nexicon will agree not to file a lawsuit against the user for distributing or downloading the copyrighted content.

#### NOTICE AND RESPONSE TO COPYRIGHT INFRINGEMENT

In large part because of public opposition, in 2008 RIAA halted its controversial strategy of suing individuals suspected of illegally pirating large amounts of digital music and announced that it would instead work with ISPs to alert Internet users of potentially illegal activity. Under this framework, the content pro-

ducers identify individual Internet users suspected of illegal file sharing by their IP address and then send the ISP the relevant information including the name of the infringing work, the filename, a time and date stamp, the IP address, IP port, and the file sharing network downloaded from. The ISP does not turn over any personally identifiable information to the copyright owners, but instead relays the message to their customers.

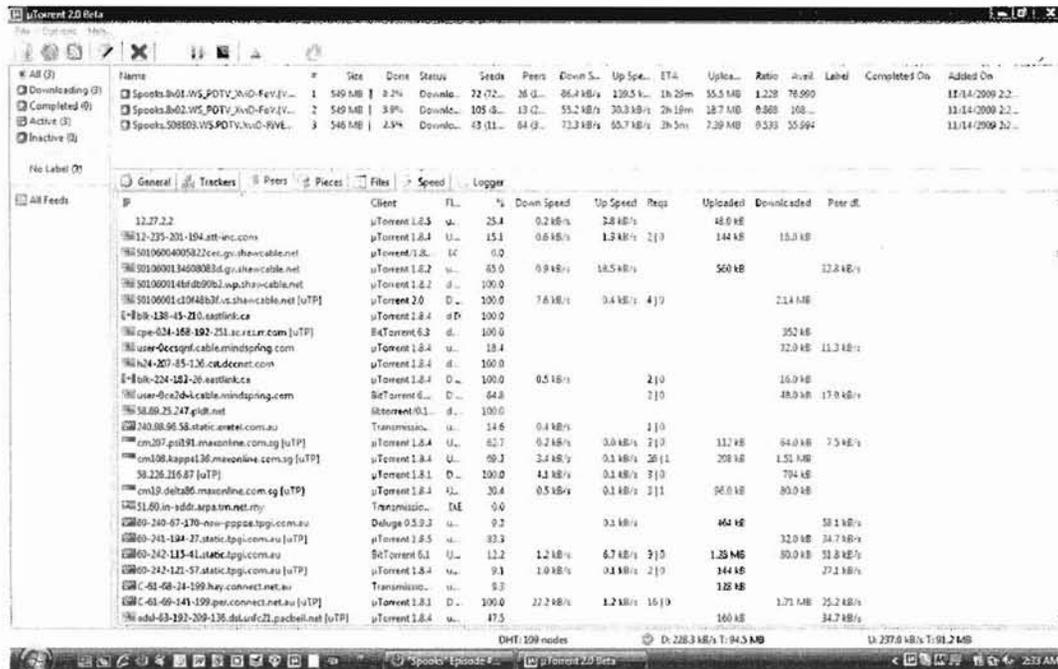
Discovering the IP address of Internet users engaged in online piracy on peer-to-peer networks is relatively straightforward. One such means is to request a piece of unlawful content and thereby enter the "swarm" of P2P users engaged in sharing or seeding it at the same time. Members of a P2P swarm are allowed to see the IP addresses of each other member of the swarm, without encryption. These addresses are perfectly transparent, which belies the claim that file sharers have any expectation of privacy. For example, here is a typical piracy swarm for the BBC television series Spooks:

By providing notice of copyright infringement, users become aware that they are responsible for their actions online and can take steps to prevent unauthorized use, such as securing a wireless router or supervising a teenager, before facing more serious consequences for misuse. Even after serving notice, content producers still retain the right to sue individual Internet users for

copyright violations. Such notices can be reasonably effective, if for no other reason than some consumers may not be aware that they are engaging in illegal action, while others who do know may not know that they are being identified as engaging in illegal actions.

Major ISPs in the United States, including Comcast, Verizon, and AT&T, participate in this arrangement with some copyright holders. For example, as of 2009, Comcast reports that it has issued 2 million notices on behalf of copyright owners.<sup>62</sup> ISPs can provide a graduated response to continued violations of copyrighted content by the same user, by providing additional warnings, and incremental punishment, up to and including a termination of the service. Cox Communications, for example, has made this a standard practice. As described by a Cox spokesperson, "When we receive notifications from RIAA or other copyright holders stating that their copyrighted material is being infringed by a customer, we pass that information along to the customer so they can correct the problem, or dispute the notice directly with the copyright holder if they feel the notice was sent in error. This notification is the most helpful thing we can do for the customer and is expected of us, as an ISP, under the DMCA. We attach a copy of the notice from the copyright holder with our message to the customer."<sup>63</sup> Although Cox sent out many notices, it has only terminated access

Figure 6: BitTorrent Swarm with IP Addresses



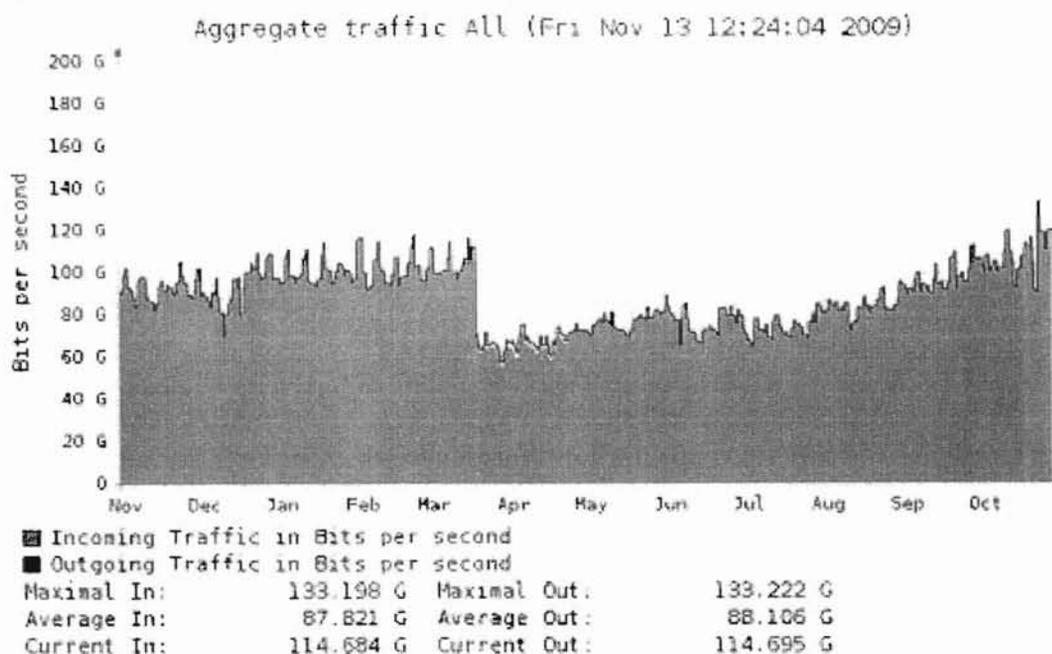
for one-tenth of one percent of those users. Comcast has stated that it has no plans to terminate access for its users. Several universities, including the University of California, have implemented rules to suspend the Internet access of students that use campus networks for illegal file sharing. Such practices, including alternatives such as bandwidth capping, browser redirection, and temporary suspension of service, can play an important role in limiting the actions of Internet users who repeatedly engage in digital piracy.

A notice system has been used with some success in other countries as well. In particular, some other nations have required ISPs to participate in these programs. For example, Sweden implemented the European Union's antipiracy directive, the Intellectual Property Rights Enforcement Directive (IPRED) in April 2009. The Swedish IPRED law requires ISPs, with a court's approval, to identify users suspected by copyright holders of illegally downloading copyrighted content. Copyright holders can then send a letter of warning to these Internet users, and if illegal activity continues, file a civil lawsuit against the infringers. A more effective law would not require court approval to send notices from copyright holders through the ISPs, as long as the notices without revealing personal information. The International Federation of the Pho-

nographic Industry (IFPI) Sweden recently noted that the legislation, in combination with growing popularity of online music services, appears to have been successful and reported that revenue for the record labels rose 18 percent in the first nine months of the year overall, and 80 percent in the digital market.<sup>64</sup> The legislation also had an immediate impact on Internet use the day it came into effect, with Internet traffic within Sweden dropping 33 percent because users were engaged in less illegal downloading of digital content.<sup>65</sup> The legislation has more recently become less effective, as some ISPs have taken action to reduce its impact by erasing all of their logs so that they are unable to comply with court orders. Some government officials have proposed new regulations that would require ISPs to maintain Internet usage logs for a minimum period, such as 6 months.<sup>66</sup>

In addition to using civil lawsuits and a voluntary system of graduated response from ISPs, some countries have implemented or are considering implementing "three strikes" laws that punish Internet users who download or distribute copyrighted material. These laws work by punishing repeat copyright infringers by cutting off their Internet access. France was one of the first countries to pass a three strikes law, and other countries including the United Kingdom, South

Figure 7: Consequence of EU Intellectual Property Rights Enforcement Directive (IPRED) on Internet Traffic



Korea, and Taiwan have followed suit with their own legislation and regulations in this area. In France, the revised law approved by the Constitutional Council in October 2009 creates a new government agency that sends warning letters to Internet users suspected of downloading copyrighted content. Users who refuse to heed notices face losing their Internet access for up to a year and additional fees. Protections have been put in place to protect free speech by requiring that no users can lose their Internet access without their case first going before a judge.<sup>67</sup>

In the United Kingdom, the Digital Economy bill would provide a similar graduated response. The bill requires ISPs to forward on notices of copyright infringement from rights holders, track the number of notifications sent to a customer, and send this data to the copyright holders. The copyright holder then can take this information to a court to get the customer's name and address to take legal action against the user. ISPs that fail to fulfill these requirements face stiff financial penalties. Internet users who infringe on copyrighted content face increasing penalties from a warning to suspending an Internet user's account. The legislation does not make file sharing a criminal offense punishable with jail time.<sup>68</sup> Mobile Internet operators have raised concerns about the cost of the proposed legislation because, unlike wired broadband operators, mobile broadband operators do not use a "one IP address per customer" system, so they would have to build a new tracking database for this purpose.<sup>69</sup>

Industry has also implemented this technique of using service bans to discourage piracy. Recently, Microsoft banned a small percentage of users from the Xbox Live service for modifying their Xbox 360 consoles to play pirated games. While users can still use their console for playing games offline, they cannot use the Xbox Live service for online game play, which is a key part of many of the most popular multiplayer games.<sup>70</sup>

## OBJECTIONS TO RIGHTS ENFORCEMENT

Any system of rights enforcement attracts criticism, some of which is legitimate, but much of which is not. One element that must be overcome as the Internet becomes established as the dominant network for communication and entertainment is its non-commercial history. The Internet was designed to serve as a vehicle for network research rather than for commerce, hence it lacks a coherent system of controls for intel-

lectual property rights (IPR), and any effort to add such controls raises complaints from a traditionalist group that's loathe to accept change in the Internet. Some digital rights enforcement schemes have been overly intrusive and poorly managed, so there is an element of legitimate criticism in this dialog.

Moreover, to some extent, there are so many ways to obtain pirated content over the Internet that any scheme of enforcement can be criticized on the basis that it will simply send pirates in some other direction, but will not impact overall copyright abuse. Hence, it is worthwhile to ask pragmatic questions about the effectiveness of proposed systems, such as:

- 1) Effectiveness: Is the system easily defeated or circumvented with no increase in inconvenience to the casual consumer of unlawful content?
- 2) Intrusiveness: Does the system impose a more than diminished burden on mainstream Internet users who are not engaged in unlawful activities and does it violate expectations of privacy in any significant way?
- 3) Cost: Is the system excessively costly, especially with respect to its benefits? Are ISPs (and hence consumers of ISP services) or government (and hence taxpayers) paying for a system that produces little benefit?
- 4) Benefit: Does the system make the enforcement of anti-piracy laws easier than it already is, without violating fundamental rights, such as self-expression and privacy?

If a proposed system of enforcement seems to do well on most of these counts, it is likely worthy of a trial to determine its real-world utility.

## POLICY RECOMMENDATIONS

As noted earlier, while industry will take the lead on many of these responses to the challenge of digital piracy, policymakers also have a key role to play. Actions that policymakers should take include the following:

### Support Anti-Piracy Innovation

Government policies should support technological innovation wherever possible, as innovation is a key driver of economic growth and productivity. Unfortunately, some advocacy groups often object to technical controls designed to prevent piracy, claiming they

are a threat to civil liberties or harmful to consumers. For example, the advocacy group Public Knowledge has argued that anti-piracy technology, such as content identification filters for ISPs, should not be “allowed, encouraged or mandated” by government even though such technology prohibitions would impair anti-piracy innovations.<sup>71</sup>

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*It is time for the U.S. government to take global theft of U.S. intellectual property generally, and digital content specifically, much more seriously.*

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Just as government should not restrict multi-purpose innovations that may inadvertently aid illegal activity—such as cryptography, networking protocols and multimedia encoding—neither should it restrict innovations that can reduce illegal activity—such as digital rights management, content identification and filtering, and network management. Restricting such innovation would mean that the technology would not improve over time. Or as a bumper sticker might say, “If you outlaw innovation, only the outlaws will innovate.”

But the federal government should do more than not restrict anti-piracy innovation, government agencies like the FCC should affirm that they take piracy seriously and encourage anti-piracy innovation and use. The federal government needs to take a clear position that it supports reasonable industry action to fight digital piracy. And the FCC should also develop a process whereby industry can consult with them on proposed uses of anti-piracy technology and consumer advocates and others can bring forward concerns about actual uses. In addition, the National Science Foundation should sponsor anti-piracy research.

### **Encourage Coordinated Industry Action**

In a competitive market, a classic prisoner’s dilemma exists where companies would be better off by implementing anti-piracy measures, but may not because the cost of acting alone is too risky. If one ad network refuses to place ads on popular piracy sites, for example, another one will likely choose to do so.

Collaborative action by various industry stakeholders has been able to address this prisoner’s dilemma in at least one area. A group of copyright owners and website

offering user-generated content hosting came together to develop a set of principles to help reduce piracy.<sup>72</sup> These principles included all parties working to “ensure that the Identification Technology is implemented in a manner that effectively balances legitimate interests in (1) blocking infringing user-uploaded content, (2) allowing wholly original and authorized uploads, and (3) accommodating fair use.”<sup>73</sup>

Going forward there is an opportunity for more industry collaboration to fight piracy. The federal government should encourage stakeholders to develop best practices and collaborative self-regulation regimes, such as implementations of a graduated response system by ISPs. However, some anti-piracy measures, such as content filtering, could require government oversight to prevent abuses and ensure consumer rights are protected, especially in the absence of a collaborative agreement among key stakeholders. Other approaches, however, such as blocking websites, may require governmental approval before industry can act. Toward this end, there is a need for a process by which the federal government, with the help of third parties, identifies websites around the world that are systemically engaged in piracy so that ISPs and search engines can block them, ad networks and other companies can refuse to place ads with them, and banks and credit card companies can refuse to process payments to them. Finally, the government should also consider providing anti-trust exemptions for collaborative industry action to address these problems.

### **Pursue International Frameworks to Protect Intellectual Property**

The United States cannot solve the problem of digital piracy alone. Nations with weak laws to protect intellectual property provide a virtual safe haven for online operations that flout copyright law. More broadly, the lack of a strong international framework for the regulation of Internet conduct means that nations are not held responsible for the data flowing out of their networks. A comprehensive solution to this problem is urgently needed to solve many online issues in addition to Internet piracy, including cybersecurity, spam, malware, and other illegal Internet content. Global partnerships are needed to develop Internet policies that will spur nations to better enforce international standards on issues such as intellectual property rights. In particular, the U.S. government should take a much more proactive position on pressuring other nations to abide by rules regarding digital content. This includes taking more

cases to the World Trade Organization (WTO), working more closely with the World Intellectual Property Organization (WIPO) and other global bodies, and including requirements for reducing content theft and penalties for failure to do so in future trade agreements. In short, it is time for the U.S. government to take global theft of U.S. intellectual property generally, and digital content specifically, much more seriously. For example, while the specific terms of the Anti-Counterfeiting Trade Agreement (ACTA) are not yet public, this type of multilateral trade agreement is necessary to create a stronger intellectual property rights regime and protect the rights of U.S. copyright holders globally. Nations that turn a blind eye to piracy should face significant pressure and penalties for doing so.

## CONCLUSION

As many others have pointed out, the Internet is a vast, distributed system that has no central point of control. This does not mean that it is free of control. Rather, it means that each of us is the controller of our small part of the system. The responsibility for maintaining the Internet commons falls upon each user, each service provider, and each business and institution that uses it, operates it, and profits by it. Governments need to put in place frameworks that facilitate and encourage responsible control. The Internet is

a tremendous enterprise of user empowerment, free speech, and innovation, but it facilitates unlawful acts just as much as lawful ones.

Because we all share the responsibility for maintaining the health and vitality of the Internet, the time has come for Internet enterprises and governments to take some measure of responsibility for maintaining its integrity. There is no legitimate reason for web sites such as The Pirate Bay or isoHunt to exist, for there to be piracy-oriented services such as LegalSounds.com, or for search engines to connect would-be pirates with each other. The Internet was not meant to be a gigantic piracy machine. It was not designed or built for the primary, sole, or major purpose of facilitating unlawful transactions, and it's shameful for proponents of piracy to hide behind the excuse that filtering or blocking access to unlawful conduct is in some way analogous to the suppression of dissent in authoritarian dictatorships like China. There is clearly an enormous difference between the actions of an undemocratic government and the legitimate desire of liberal democracies to limit the ill-gotten gains of piracy promoters, advertisers, and service providers. The time has come for the law to catch up with technology by adopting a reasonable set of enforcement measures to make piracy less prevalent and less blatant on the Internet.

## ENDNOTES

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7. Measuring losses to piracy is an imperfect science because pirated software is not a perfect substitute for legally purchased software. The methodology varies by study on how to best quantify losses due to global piracy. First, it is uncertain what the actual rate of piracy is: some studies take the number of actual confiscated pirated products in police raids and assume they represent some percentage of the total number of pirated goods while other studies rely on surveys to estimate the number of pirated goods. The majority of studies evaluated here follow the latter methodology. Beyond this point there is a larger issue of determining to what degree pirated material represents a loss to the industry. In other words, how many pirated products would have been purchased legally if piracy was not an option? Some studies assume a one-to-one substitution, all pirated material would have been purchased and thus the market value of pirated goods represents the actual loss, an overly optimistic assumption. Other studies take a different approach and use surveys to determine what percentage of those who use pirated material would have purchased these goods if piracy was not an option. As with all survey research there is a large degree of uncertainty in the conclusions of these surveys. On the one hand, it is plausible that individuals are likely to tell a surveyor they would purchase legitimate goods when in reality they would not; on the other, it is also plausible that those who openly admit to owning pirated material are likely to be those who do not think piracy is wrong and are more likely to state that they would be unwilling to purchase legal copyrighted material. The point in all this is there is much uncertainty in the data.
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